

Electra Configuration Details

Electra, NASA's first prototype modular supercomputing system, is housed in a module a short distance from the primary NASA Advanced Supercomputing (NAS) facility. Electra is configured as follows:

- 16 Broadwell racks and 8 Skylake E-cells
- 3,456 nodes
- 124,416 cores
- 589 terabytes total memory
- 8.32 petaflops theoretical peak performance

Hostnames

There are 4 individual rack units (IRUs) in each rack. For every two racks, there is a rack leader controlling them. The naming convention for the nodes residing in every two racks uses only odd rack numbers.

Broadwell

18 nodes per IRU, with 144 nodes residing in every two racks (2 racks x 4 IRUs x 18 nodes).

The hostnames for the Broadwell nodes are $r[x]i[0-7]n[0-17]$, where x = odd numbers between 1 and 15.

Skylake

36 nodes per IRU, with 288 nodes residing in every two racks (2 racks x 4 IRUs x 36 nodes).

The hostnames for the Skylake nodes are $r[x]i[0-7]n[0-35]$, where x = odd numbers between 133 and 147.

Processor, Memory and Network Subsystems Statistics

Electra's system architecture is ICE X. The following table provides detailed configuration statistics for the processor, memory, and network subsystems:

Processor	
Broadwell	
CPU	14-Core Xeon E5-2680v4
Newest Instruction Set	AVX2
Hyperthreading	ON
TurboBoost	ON
CPU-Clock	2.4 GHz
Maximum Double Precision Floating Point Operations per Cycle per Core	16
# of Cores/node	28
Total # of Nodes	1,152
Total # of Cores	32,256
Total Double Precision TFlops	1,239
Memory	

L1 Cache	Local to each core; Instruction cache: 32K Data cache: 32K; Associativity: 8; Cache line size: 64B
L2 Cache	256 KB per core; Associativity: 8; Cache line size: 64B
L3 Cache	35 MB shared inclusive by the 14 cores; Associativity: 20; Cache line size: 64B
TLB	Local to each core
Default Page Size	4 KB
Memory/Core	4.6 GB; DDR4
Total Memory/node	128 GB;
Memory Speed and Bandwidth	2400 MHz; 4 channels; 76.8 GB/sec read/write
Intersocket Interconnect	QuickPath Interconnect 4.8 GHz, 9.6 GT/s, or 38.4 GB/sec
	Inter-node Network
IB Device on node	Dual single-port 4x FDR IB Mezzanine card (2 single-port HCAs); 56 Gbits/s
IB Switches between nodes	4x FDR; 56 Gbits/s

Article ID: 537
 Last updated: 28 May, 2019
 Revision: 27
 Systems Reference -> Electra -> Electra Configuration Details
<https://www.nas.nasa.gov/hecc/support/kb/entry/537/>